

Test note of 1.3GHz single-cell cavity TE1AES004 8th VT in A0

Mingqi and Elvin

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The brief history of this cavity:

1.3GHz single-cell Cavity TE1AES004 was manufactured by AES Corporation, and BCP'd 107 μ m; EP'd 65 μ m; and baked 120C 48 hrs. A huge pit was found by Kyoto inspection machine. The 5th, 6th and 7th tests in IB1 and A0 show the cavity quenched at Eacc=39MV/m and non-FE. The cavity was kept under vacuum since last vertical test. The main purpose of this test is to find the quench location.

The process and test results:

Before pumping down, the cable was calibrated. The cable loss factors are Cf=33.63, Cr=35.86, and Ct= 5.99. The data is closed to last 1.3GHz cavity test data. The average Qt value equal 5.083E12, which was measured 3 times from Eacc=3.06MV/m to 4.03 MV/m at 2K. During the Eacc vs. Q0 measurement, the X-ray started at 19.09MV/m, and first quench happened at 19.9MV/m, after that processing started and several quenches happened. The cavity finally quenched at 37MV/m, and Q0=5.13E9, X-ray radiation level was very low. Fig1 is the Eacc vs. Q0 curve.

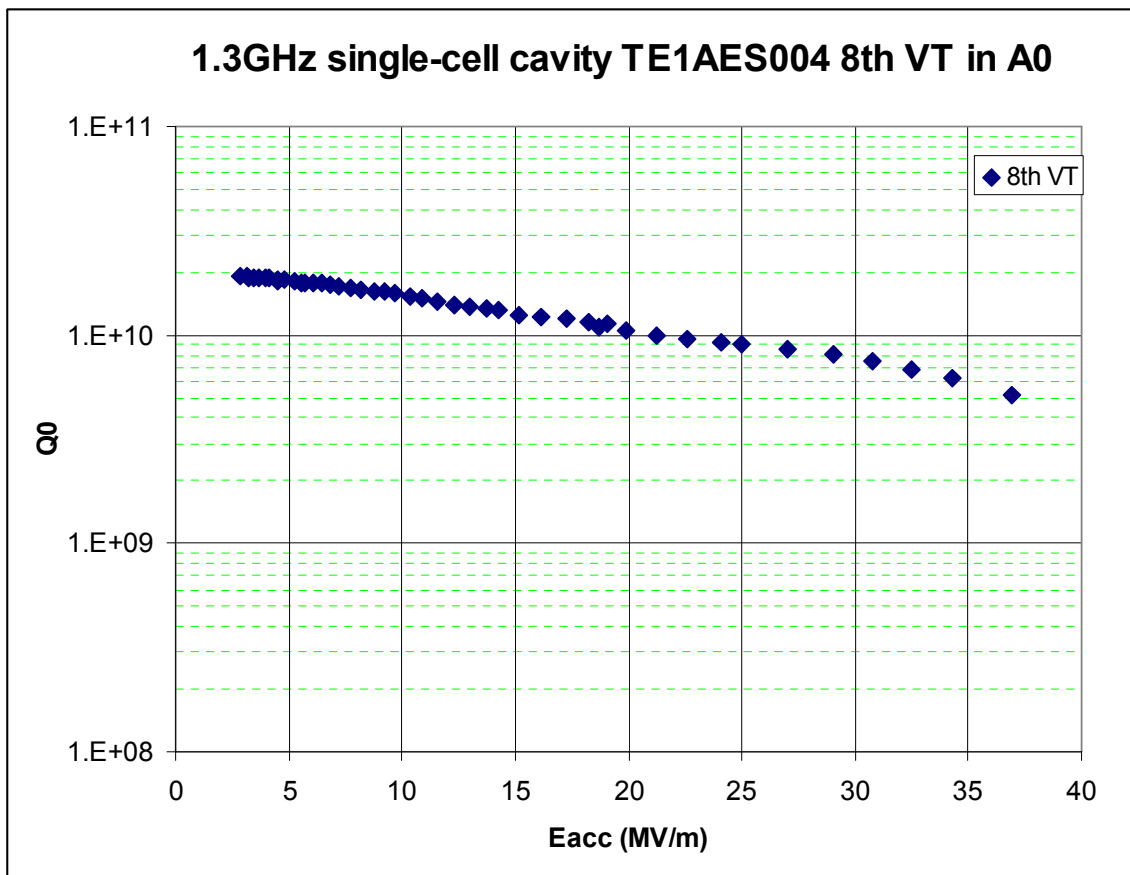


Fig 1 Eacc vs Q0 curve

Quench location:

Totally there were 8 fast thermometers used in this test, Fig2 shows the fast thermometers location, thermometer No.9 was right on the pit, which was found by Kyoto inspection system. No.10 was close to No.9, and the other six fast thermometers were attached around the equator.

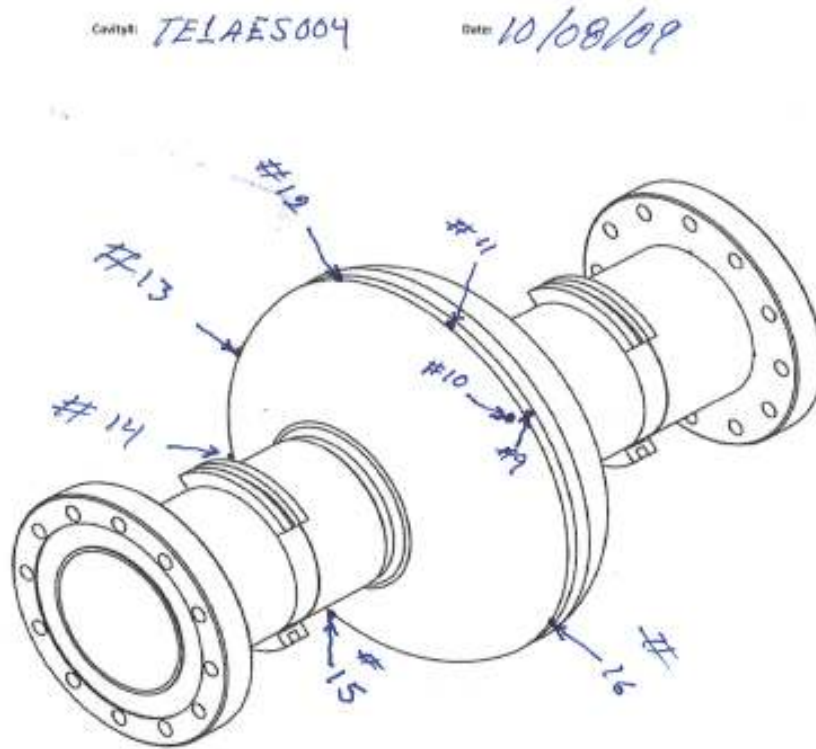


Fig 2 fast thermometers location

Fig 3 shows the thermometers reading before quenching. The temperature value spread from 2.1K to 2.26K, that's the system error.

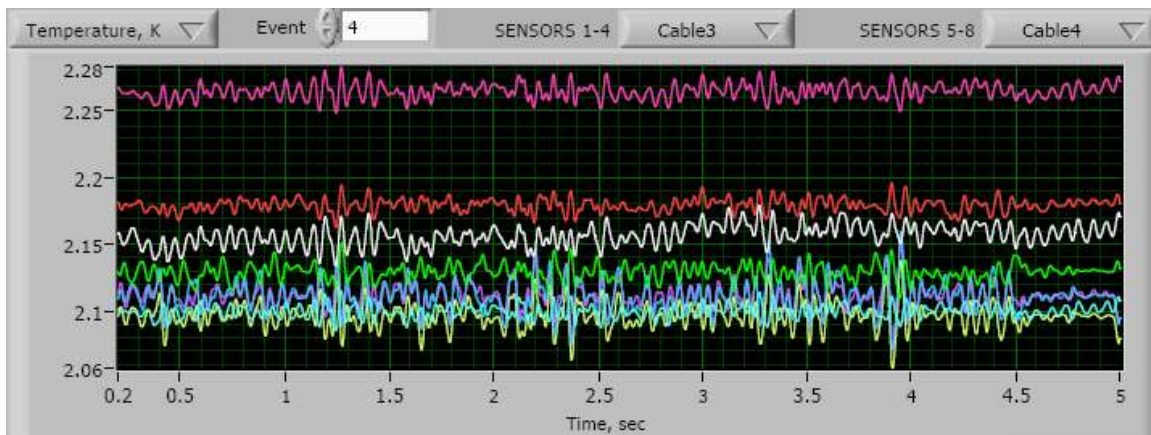


Fig 3

During the cavity quenching, the thermometer No.9 showed the temperature dramatically rising (Fig 4).

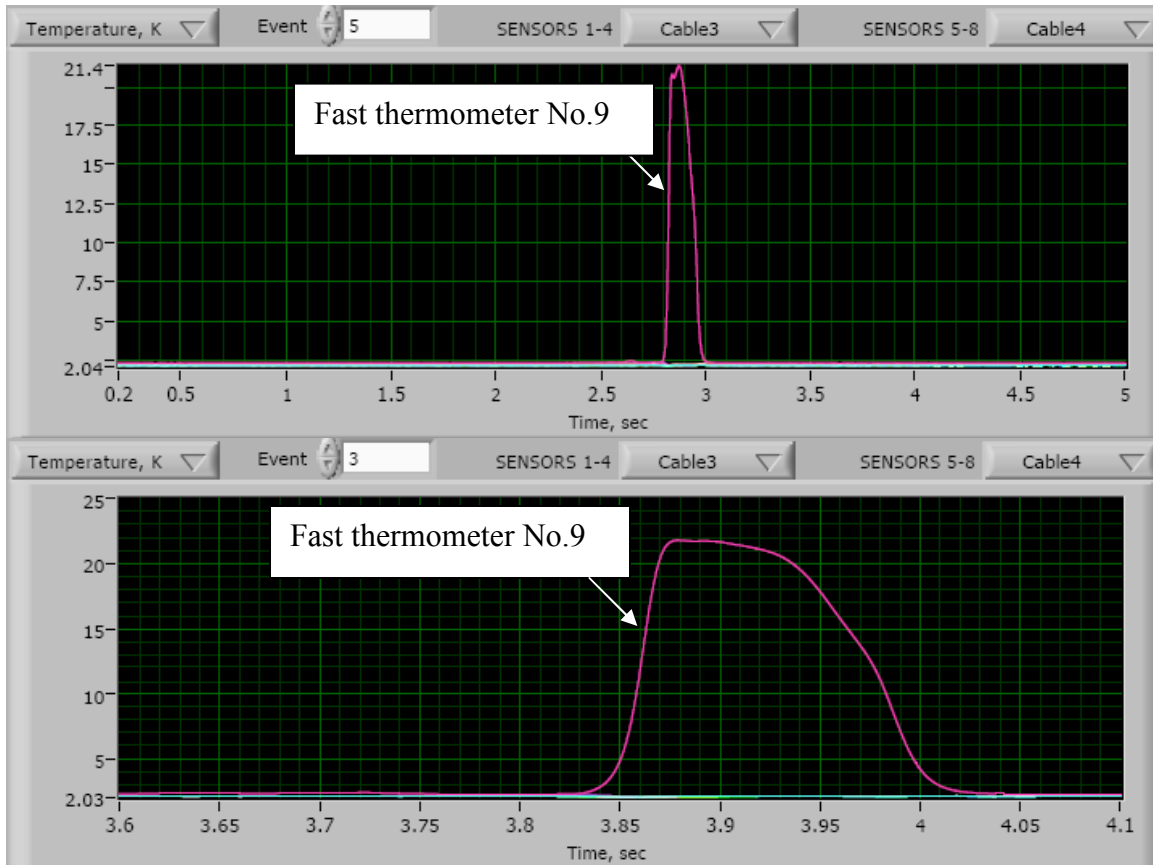


Fig 4.

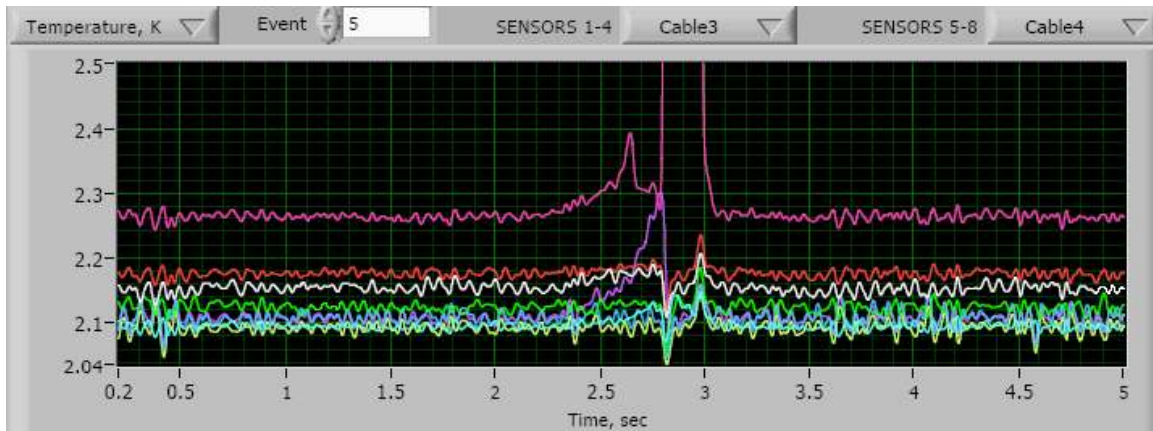


Fig 5.

When we zoomed out the temperature scale from 2K to 2.5K (Fig 5), we found thermometer No.16, No. 10, No. 11, No.12 also showed heating points.

Conclusion:

The cavity RF performance is same with last test. Based on the fast thermometers result, we found cavity quenched at the pit. Besides that point, there were several heating points. The next step is to use this cavity calibrate T-mapping system, and to confirm this test result further and also looking for the whole information of hot spots.